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**TECHNOLOGY AND FERNALD FERNALD
ENVIRONMENTAL MANAGEMENT PROJECT
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FERNALD

Environmental Management Project

INTRODUCTION

The development and use of available technologies supports the Fernald commitment to cleanup by applying the most efficient and cost-effective service available to project efforts. In order to reduce cost, Fernald Environmental Restoration Management Corporation (FERMCO), the Environmental Restoration Management Contractor at Fernald, is working to ensure that cleanup methods in use on site are the most effective available. The introduction of safer, faster equipment, and the use of well-designed technologies ensures shorter cleanup time and reduction in cost.

How can Recycling Technologies be used to reduce waste volumes?

About 5 million cubic yards of waste will be generated by the Fernald cleanup. The goal at Fernald is to identify those classes of material (metal, concrete, etc.) that can be recycled or "beneficially reused" so that the volumes requiring disposal can be minimized.

For example, a beneficial reuse program is currently underway with the Scientific Ecology Group (SEG). SEG has been contracted to take Fernald scrap metal, melt it in its Oak Ridge, Tenn. facility, and then cast the metal into shield blocks for use in the Supercollider project in Texas. In addition, Fernald is providing SEG

with metal that will be used to fabricate waste containers which can be used by Fernald to ship waste to the Nevada Test Site.

Material not used for recycling or "free release" into consumer markets will be disposed of in accordance with all applicable regulations.

Current Technological Innovations

The Uranium Soils Integrated Demonstration is underway. Fernald was selected to evaluate technology for removing uranium from soils using an integrated demonstration approach. Soil washing is a generic term for soil decontamination, and describes a number of processes adapted from mining technologies. These technologies remove contaminants from soil using chemical or physical methods, or a combination. Clean soil is typically returned to the site of excavation, and the remaining contaminated fraction presents a smaller volume of material requiring disposition.

Cementation, a stabilization process, uses cement additives to store material from the waste pits in a solid form. Tests have been conducted to determine the best combination of cement additives to ensure safe and stable long-term storage of hazardous materials in concrete.

Another treatment technology being tested at Fernald is vitrification.

Samples from each of the waste pits in have been mixed with a range of materials, such as flyash from coal burning, and heated in furnaces to form glass. In the form of glass pellets, waste is immobilized and safer for the environment.

A very promising technique for stabilizing and transporting waste being developed by FERMCO is polymer encapsulation. This technique uses commonly available non-toxic plastics such as polyethylene to securely surround and bind together particles of dried waste material. This technology results in a safe and impact resistant form for shipping, is lightweight, and has a long storage life.

Future Technology Options

Rotasonic (Spoil-less) Drilling, a drilling technology developed in Canada, has been successfully demonstrated for use at the Fernald site. This method of drilling is accomplished by using a sonic head located on the drill mast, which allows for a consistent cut. Because the bit never leaves the surface of the material being drilled, almost all of the sample is captured in the core barrel, eliminating sample loss or cross contamination, and greatly reducing drill cuttings (95%-100% reduction). This method is capable of drilling 130 feet in two days, a depth which is accomplished in 2-3 weeks at Fernald with current methods.

Solid Block Modeling, developed by Fluor Daniel, parent company of FERMCO, for use in the mining industry, uses three-dimensional computer screen pictures to show the location and the extent of contamination at various Fernald locations. This technique aids in the difficult process of site characterization. By visually expressing information on the amount and types of contamination and where it is located, cleanup plans can be executed more accurately and effectively. Solid block modeling has already proven to be a valuable tool in the Fernald project by identifying "gaps" in existing characterization data, and producing maps of contamination to aid in future sampling efforts.

A new groundwater sample collection method, **Micro-Purge Technology**, may greatly reduce investments in time and money for groundwater monitoring. By eliminating the need for excessive

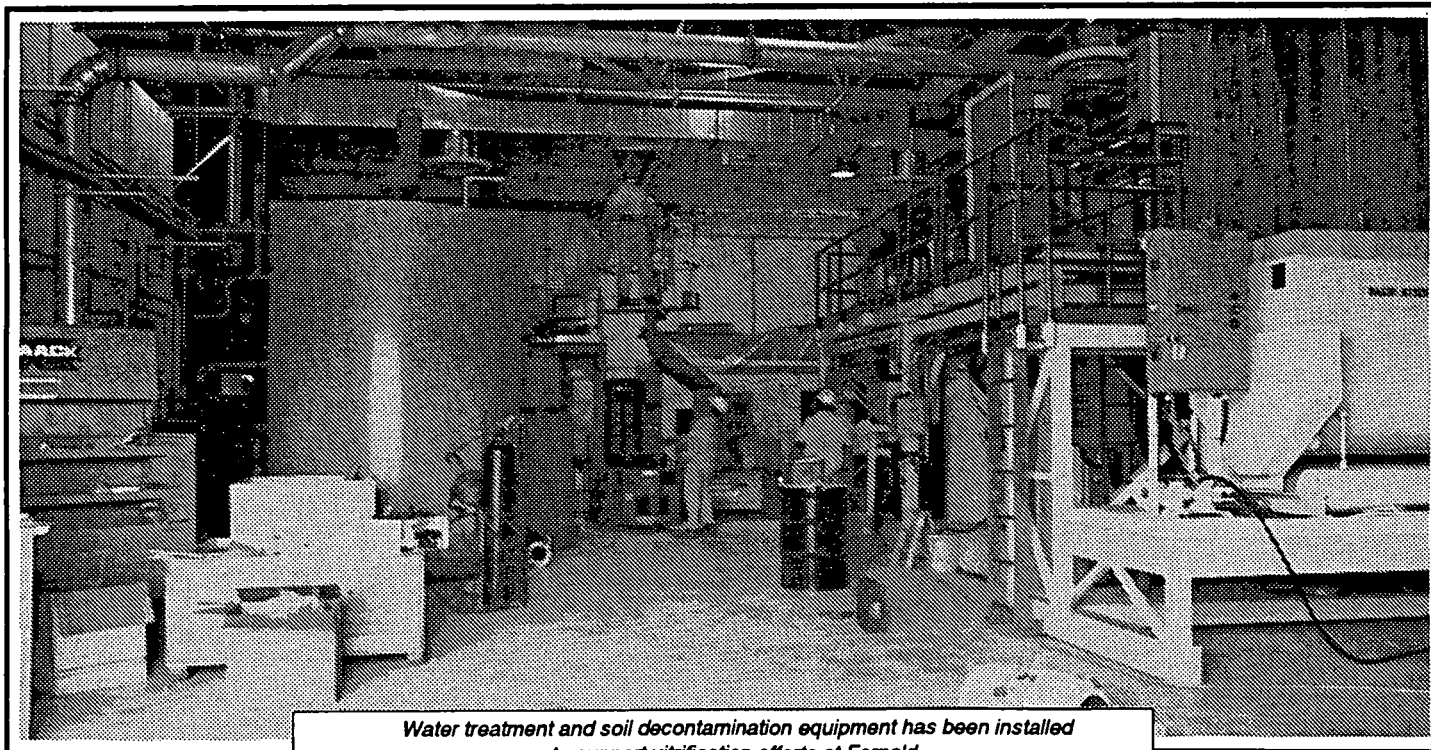
well-water purging during monitoring operations, sample accuracy can be improved due to less pumping and water dilution effects. The enormous volumes of contaminated water samples requiring disposal can be significantly reduced.

Virtual Imaging has been introduced for consideration and potential use in efforts to dismantle Fernald's contaminated buildings. This technology uses a combination of video images and computer screens to run tests of proposed building decontamination and dismantlement plans. If used, virtual imaging would allow engineers to create ideal deconstruction work plans, possibly incorporating robotics for labor, which would result in reduced cost and reduced exposure to workers.

Contaminated soil and sludge at Fernald need to be treated so

that the contaminants cannot further damage the environment. A combination of technologies may work to solve this problem: soil decontamination, water treatment and glassification. A process called Minimum Additive Waste Stabilization (MAWS) uses soil washing to strip uranium from the soil and concentrate it. After mixing this concentrate with other wastes such as sludge, a glassification process turns this concentrate to glass, which is a much safer form. Volume reduction is further enhanced by coupling glassification with soil decontamination and water treatment. The output streams from MAWS are clean soil, clean water, and treated glass.

For more information about this topic or about other Fernald activities and issues, contact the Office of Public Information, DOE Fernald Field Office, at (513) 648-3131.



Water treatment and soil decontamination equipment has been installed to support vitrification efforts at Fernald.